PATENT ABSTRACTS OF JAPAN

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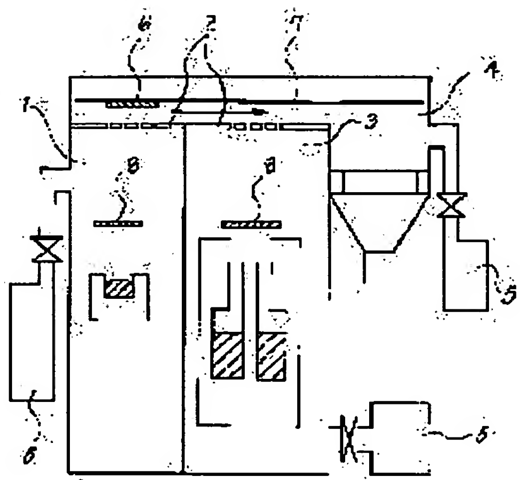
(54) MANUFACTURE OF LAMINATED THIN FILM CAPACITOR

(57)Abstract:
PURPOSE: To improve processing capacity of a series of steps for forming a laminated thin film capacitor element.
CONSTITUTION: The method for manufacturing a laminated thin film capacitor comprises the steps of pattern-forming a thin film electrode with a platelike stationary mask 2, pattern-forming an organic dielectric thin film with the mask 2, and irradiating an entire board 6 with a microwave plasma, which are conducted under the same pressure in the same vacuum tanks so as to continuously process the steps in the same tanks 1, 2, 3 and then repeating these steps.



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CLAIMS

[Claim(s)]
[Claim 1] The manufacture approach of the laminating thin film capacitor which is under the same pressure, and performs the process which carries out pattern formation of the thin film electrode, the process which carries out pattern formation of the organic dielectric thin film, and the process which irradiates the plasma to the whole substrate surface within the same vacuum tub, and repeats and carries out the laminating of these processes further.
[Claim 2] The manufacture approach of a laminating thin film capacitor according to claim 1 that a plasma exposure is the microwave plasma.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the manufacture approach of a laminating thin film capacitor of having used the organic dielectric thin film.
[0002]
[Description of the Prior Art] In recent years, by small and lightweight-ization of electronic equipment, progress of the formation of surface high density assembly of electronic parts is remarkable, and want of chip-izing and the miniaturization to electronic parts is strong. It is in it, various measures are taken for a miniaturization also in a capacitor, and the laminating thin film capacitor using the organic dielectric thin film as one of them is examined.
[0003] The internal structure of a laminating thin film capacitor is shown in drawing 3 . In drawing, 11 is a substrate, the thin film electrode 12 and the organic dielectric thin film 13 are formed by turns on this substrate 11, one side is protected by the protective coat 14, and the external electrode 15 is formed in both sides.
[0004] Within a vacuum tub, formation of such the component section of a laminating thin film capacitor carries out the laminating of the thin film electrode 12 and the organic dielectric thin film 13 by turns, and is obtained. The tabular fixed mask of illuminator is used for pattern formation, and the component structure shown in drawing 3 is acquired. There is vacuum evaporationo etc. as means forming of an organic thin film, and formation of an electrode is performed by vapor-depositing a metal using an electron beam method, sputtering, etc. Thus, the component of the manufactured laminating thin film capacitor performs closure by the protective coat 14, in order to raise a resistance to environment, especially moisture resistance, it forms the external electrode 15, and is completed as a laminating thin film capacitor.
[0005] The manufacture approach of the conventional laminating thin film capacitor is explained below. Drawing 4 shows the schematic diagram of the formation equipment of the component section of the conventional laminating thin film capacitor. In this drawing 4 , 16 is a thin film electrode formation room, 17 is a dielectric thin film formation room, and, as for these formation rooms 16 and 17, air is extracted with the vacuum pump 18. The tabular fixed mask of illuminator 19 is formed in the upper part of the thin film electrode formation room 16 and the dielectric thin film formation room 17, and the upper part of this tabular fixed mask of illuminator 19 is equipped with the substrate conveyance table 20, and it is constituted so that a substrate 11 may be conveyed. In addition, 21 is a shutter and 22 is a diaphragm.
[0006] When manufacturing a laminating thin film capacitor using the formation equipment of a more than, each formation room 16 and 17 is exhausted by the vacuum pump 18. the substrate 11 introduced into these formation rooms 16 and 17 is attachment ******(ed) downward by the substrate conveyance table 20 in a component forming face. After formation of a component forms the thin film electrode 12 in a predetermined pattern with the tabular fixed mask of illuminator 19, it is carried in to the organic dielectric thin film formation room 17 divided with the diaphragm 22, and, similarly forms the dielectric thin film 13 in a predetermined pattern with the tabular fixed mask of illuminator 19. In addition, thickness is controlled by closing motion of a shutter 21 by predetermined thickness. The predetermined number of products of the above processes is repeated, and the component section is completed.
[0007]
[Problem(s) to be Solved by the Invention] However, when manufacturing the laminating thin film capacitor of the above-mentioned configuration at the above-mentioned process, the big problem had arisen by both sides of a property and productivity.
[0008] First, about a property side, there was a problem that a monomer component, an imperfection polymerization component, and the dielectric component itself adhered to the unnecessary location besides the pattern of a capacitor element, reduced the adhesion force of a protective coat, and closure nature deteriorated by the leakage of the organic material from the gap of the tabular fixed mask of illuminator 19.
[0009] Especially adhesion of the monomer components and imperfection polymerization objects to a location other than a need pattern, or the dielectric component itself is generated, when a pyrolysis polymerization or a vacuum evaporationo polymerization is used, and appearing notably and mainly conveying a substrate 11 to the formation rooms 16 and 17. Since this performs continuation membrane formation and it cannot take the structure which opens and closes an evaporation source by the shutter 21, it is for the organic substance which separated to exist in the formation rooms 16 and 17, and to adhere to a substrate 11. Moreover, in order to carry out continuation membrane formation of the pattern formation more efficiently, it is most effective to use the tabular fixed mask of

illuminator 19, but in the tabular fixed mask of illuminator 19, since the above-mentioned component leaks from a minute gap with a substrate 11, even if it uses which membrane formation method, the above-mentioned component will adhere to locations other than a pattern.

[0010] As the problem on such a property is shown in Japanese Patent Application No. No. 307453 [two to], after carrying out pattern membrane formation of the organic dielectric thin film, property degradation could be prevented by performing a plasma exposure all over a substrate.

[0011] Since the new a plasma exposure process of having mentioned above was added about the productivity issue on the other hand, When the laminating thin film capacitor component section is formed using the tabular fixed mask of illuminator 19, The process which forms the thin film electrode 12, the process which forms the organic dielectric thin film 13, The big problem that productivity will fall had newly arisen as three processes of the process which irradiates the plasma had to be repeated to the number of laminatings required as a series of processes and the number of laminatings increased.

[0012] Although that by which a vacuum evaporationo process and two processes of glow discharge down stream processing are incorporated in the same vacuum tub is known for the continuation vacuum evaporationo machine of a film from the former, the method of repeating three above-mentioned processes to a predetermined count, and performing a laminating is not considered.

[0013] This invention aims at offering the approach of raising the throughput of a series of processes which form the laminating thin film capacitor component section.

[0014]

[Means for Solving the Problem] In order to attain the above-mentioned object, the manufacture approach of the laminating thin film capacitor of this invention is under the same pressure, and performs the process which carries out pattern formation of the thin film electrode, the process which carries out pattern formation of the organic dielectric thin film, and the process which irradiates the plasma to the whole substrate surface within the same vacuum tub, and has composition which repeats these processes further.

[0015] The microwave plasma is especially used as a plasma irradiating method.

[0016]

[Function] In order to solve the conventional technical problem, in the formation approach of a laminating thin film capacitor, the vacuum tub which became independent at each of three processes of a plasma treatment process in addition to the formation process of a thin film electrode and the formation process of a dielectric thin film was prepared. Therefore, when degree of vacuums differed between each tub, the diaphragm for maintaining a degree of vacuum was formed, and closing motion and pressure regulation of the diaphragm were needed for migration of a component. That is, it is necessary for it to be necessary to process by making a pressure high, after the high process of the processing pressure force once making a pressure low and supplying a component compared with other processes, and to make the pressure of a vacuum tub low again, and to take out the component after processing by such component formation approach. If such a forming method is performed, when the duration per layer will be multilayered by being long, productivity will be reduced remarkably. However, in this invention, since the actuation pressure between processes is equal, adjustment of the pressure by closing motion, a bulb, etc. of the diaphragm between vacuum tubs not only becomes unnecessary, but on the occasion of migration between the processes of a component, continuous processing within the same vacuum tub is attained, and productivity improves substantially. The microwave plasma exposure which furthermore used the coaxial tube has a low actuation pressure, and since differential pressure with the process of low voltage force, such as an electron beam method and a vacuum evaporationo polymerization method, is small, it is effective to these formation approaches.

[0017]

[Example]

(Example) It explains hereafter, referring to drawing 1 about the example of this invention.

[0018] Drawing 1 is the outline sectional view of the equipment which incorporated three processes of this invention in the same vacuum tub. In drawing 1 , 1 is a thin film electrode formation room, and is a chamber which carries out pattern formation of the thin film electrode of aluminum which used electron beam vacuum deposition with the tabular fixed mask of illuminator 2. 3 is a dielectric thin film formation room, and is a chamber which carries out pattern formation of the aromatic series polyurea dielectric thin film which used the vacuum evaporationo polymerization method with the tabular fixed mask of illuminator 2. 4 is the plasma treatment room which used the microwave discharge of a coaxial tube method. These chambers are exhausted to a 5x10 to 2 Pa pressure by three vacuum pumps 5.

[0019] The substrate 6 introduced into the above and a vacuum tub places a component forming face upside down, and is attached in the substrate conveyance table 7. Component formation forms 2000A of aromatic series polyurea thin films which are a dielectric by the vacuum evaporationo polymerization method, after forming 500A of aluminum vacuum evaporationo film by the electron beam method first. In addition, thickness is controlled by closing motion of a shutter 8 by predetermined thickness. Then, it carries in to the plasma treatment room 4 succeedingly, the microwave plasma performs a plasma exposure for 1 minute all over substrate 7, and an excessive affix is removed. The above process is repeated and the component of 50 layers (capacity 5nF) is completed. According to this method, the processing time per layer was about sum total abbreviation 4 minute.

[0020] (Example of a comparison) It explains hereafter, referring to drawing 2 about the example of a comparison of this invention. Drawing 2 shows the outline sectional view of the equipment when using RF plasma as a plasma treatment method. In addition, the same drawing number is used about the same member as the above-mentioned

example. That this example of a comparison differs from the configuration of the above-mentioned example of drawing 1 are the point which used RF plasma as plasma treatment, and a point which each vacuum tub becomes independent and is divided with the diaphragm 9.
[0021] When performing RF plasma treatment, the processing pressure force is 1-10Pa, and since the pressure is high as compared with other processes, the diaphragm 9 for dissociating with other processes is needed. Therefore, when performing RF plasma treatment, closing motion of a diaphragm 9 and the pressure regulation at the time of component migration are needed. Then, when the same component as an example was formed, the processing time per layer was about 6 minutes.
[0022] If the component forming method it was indicated to this example that was clear from this result is performed, the time amount compaction for about 2 minutes will be attained per layer, and a throughput will become 1.5 times. As explained above, it becomes possible to lose the differential pressure of each part store for every process by performing 3 of the process which forms a thin film electrode, the process which forms an organic dielectric thin film, and the process which irradiates the plasma to the substrate 6 whole surface processes by the same pressure according to this example, and improvement in productivity is attained by incorporating three processes in the same vacuum tub simultaneously. It is dramatically effective to use the microwave plasma treatment approach that especially an actuation pressure is low in combination with the thin film forming method in which high-speed membrane formation of an electron beam method, a vacuum evaporationo polymerization method, etc. is possible.
[0023]
[Effect of the Invention] This invention performs thin film electrode formation, formation of a dielectric thin film, and plasma treatment to a substrate top by the same pressure and the same vacuum tub so that clearly also from the above-mentioned example, and it can realize the manufacture approach of a laminating thin film capacitor with sufficient productivity by repeating and carrying out the laminating of these further.

[Translation done.]

TECHNICAL FIELD

[Industrial Application] This invention relates to the manufacture approach of a laminating thin film capacitor of having used the organic dielectric thin film.

[Translation done.]

PRIOR ART

[Description of the Prior Art] In recent years, by small and lightweight-ization of electronic equipment, progress of the formation of surface high density assembly of electronic parts is remarkable, and want of chip-izing and the miniaturization to electronic parts is strong. It is in it, various measures are taken for a miniaturization also in a capacitor, and the laminating thin film capacitor using the organic dielectric thin film as one of them is examined.
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[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention] This invention performs thin film electrode formation, formation of a dielectric thin film, and plasma treatment to a substrate top by the same pressure and the same vacuum tub so that clearly also from the above-mentioned example, and it can realize the manufacture approach of a laminating thin film capacitor with sufficient productivity by repeating and carrying out the laminating of these further.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, when manufacturing the laminating thin film capacitor of the above-mentioned configuration at the above-mentioned process, the big problem had arisen by both sides of a property and productivity.
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[Translation done.]

MEANS

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OPERATION

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[Translation done.]

EXAMPLE

[Example]

[Translation done.]

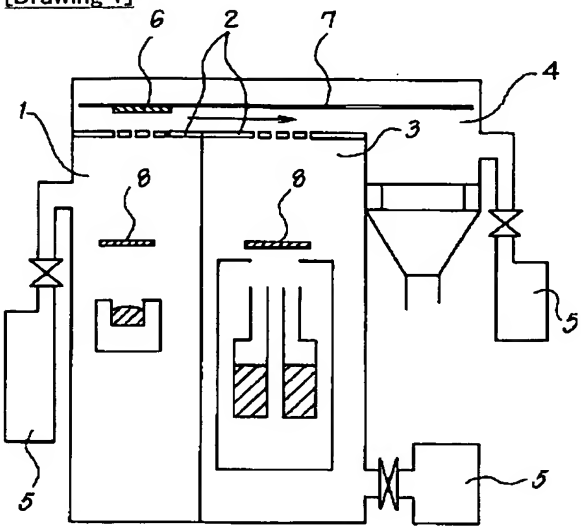
DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the outline sectional view of the equipment which forms the laminating thin film capacitor in the example of this invention.
[Drawing 2] It is the outline sectional view of the equipment which forms the laminating thin film capacitor in the example of a comparison of this invention.
[Drawing 3] It is the outline sectional view of a laminating thin film capacitor.
[Drawing 4] It is the outline sectional view of the equipment which forms the conventional laminating thin film capacitor.
[Description of Notations]
1 Thin Film Electrode Formation Room (Electron Beam Method)
2 Tabular Fixed Mask of Illuminator
3 Dielectric Thin Film Formation Room (Vacuum Evaporationo Polymerization Method)
4 Plasma Treatment Tub (Microwave OrRF)
5 Vacuum Pump
6 Substrate
7 Substrate Conveyance Table
8 Shutter

[Translation done.]

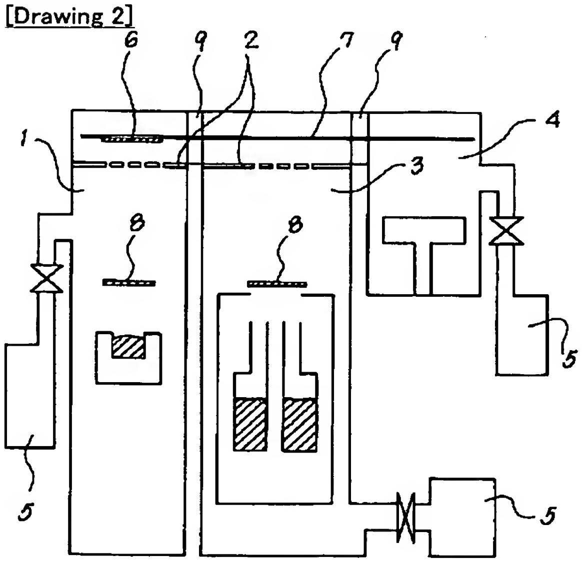
DRAWINGS

[Drawing 1]

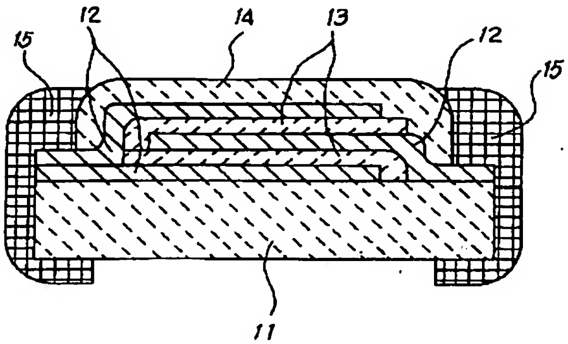


1 --- 薄膜電極形成室
3 --- 誘電体薄膜形成室
4 --- プラズマ処理室
6 --- 基板

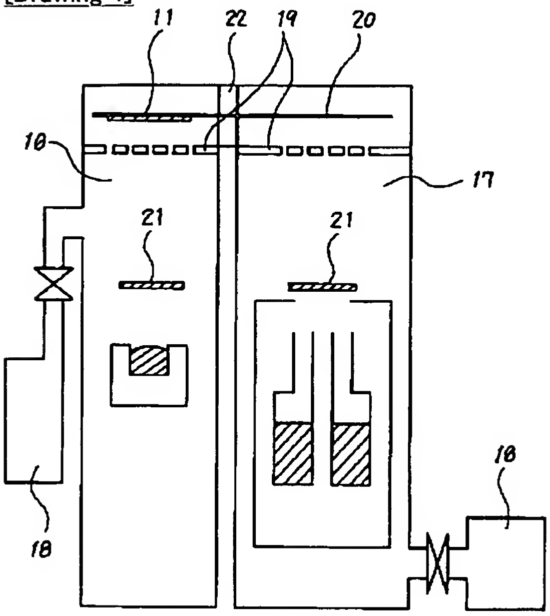
[Drawing 2]



[Drawing 3]



[Drawing 4]



[Translation done.]

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	4/30	311 F	8019－5E		

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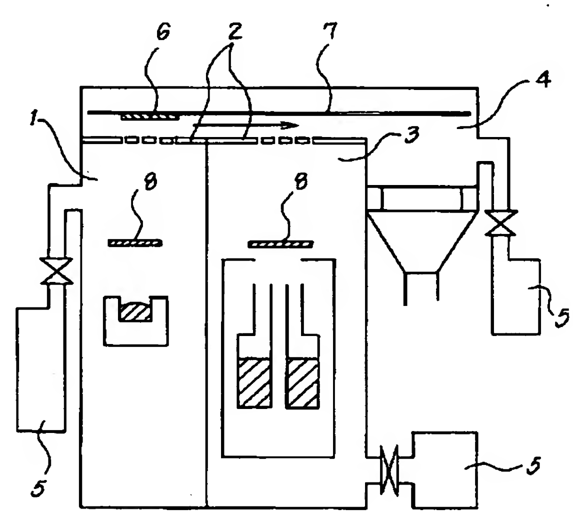
最終頁に続く

(54)【発明の名称】　積層薄膜コンデンサの製造方法

(57)【要約】
【目的】　積層薄膜コンデンサ素子部を形成する一連の工程の処理能力を向上させる。
【構成】　板状固定マスク２により薄膜電極をパターン形成する工程と、板状固定マスク２により有機誘電体薄膜をパターン形成する工程と、マイクロ波プラズマを基板６全面へ照射する工程とからなり、これらの工程を同一真空槽1,2,3 内での連続的な処理を可能とするために同一圧力下でかつ同一真空槽内で行い、さらにこれらの工程をくり返す構成となっている。



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3 ― 誘電体薄膜形成室
4 ― プラズマ処理室
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【特許請求の範囲】

【請求項１】　薄膜電極をパターン形成する工程と、有機誘電体薄膜をパターン形成する工程と、基板全面へプラズマを照射する工程とを同一圧力下でかつ同一真空槽内で行い、さらにこれらの工程をくり返して積層する積層薄膜コンデンサの製造方法。

【請求項２】　プラズマ照射がマイクロ波プラズマである請求項１記載の積層薄膜コンデンサの製造方法。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、有機誘電体薄膜を用いた積層薄膜コンデンサの製造方法に関するものである。

【０００２】

【従来の技術】近年、電子機器の小型・軽量化により、電子部品の表面高密度実装化の進展はめざましく、電子部品に対するチップ化、小型化の要望が強くなっている。その中にあってコンデンサにおいても小型化への種々の取り組みが行われ、その中の一つとして有機誘電体薄膜を用いた積層薄膜コンデンサが検討されている。

【０００３】図３に積層薄膜コンデンサの内部構造を示す。図において、１１は基板であって、この基板１１上に薄膜電極１２と有機誘電体薄膜１３とが交互に形成され、片面が保護膜１４で保護され、両側に外部電極１５が設けられている。

【０００４】このような積層薄膜コンデンサの素子部の形成は、真空槽内で薄膜電極１２と有機誘電体薄膜１３とを交互に積層して得られる。パターン形成には板状固定マスクを使用して、図３に示す素子構造を得る。有機薄膜の形成手段としては蒸着などがあり、電極の形成は電子ビーム法、スパッタリングなどを用い金属を蒸着して行う。このようにして製造した積層薄膜コンデンサの素子は耐環境性、特に耐湿性を高めるために保護膜１４による封止を行い、外部電極１５を設けて積層薄膜コンデンサとして完成する。

【０００５】以下に従来の積層薄膜コンデンサの製造方法について説明する。図４は従来の積層薄膜コンデンサの素子部の形成装置の概略図を示したものである。この図４において、１６は薄膜電極形成室で、１７は誘電体薄膜形成室であって、これらの形成室１６，１７は、真空ポンプ１８で空気が抜かれている。薄膜電極形成室１６と誘電体薄膜形成室１７の上部に板状固定マスク１９が設けられており、この板状固定マスク１９の上部に基板搬送テーブル２０を備え、基板１１が搬送されるように構成されている。なお、２１はシャッター、２２は仕切り板である。

【０００６】以上の形成装置を用いて積層薄膜コンデンサを製造する場合は、それぞれの形成室１６，１７は、真空ポンプ１８により排気される。この形成室１６，１７に導入された基板１１は、基板搬送テーブル２０に素子形成面を下向きに取りつけらて搬送される。素子の形成は、薄膜電極１２を板状固定マスク１９により所定のパターンに形成したのち、仕切り板２２で仕切られた有機誘電体薄膜形成室１７に搬入され、誘電体薄膜１３を同じく板状固定マスク１９により所定のパターンに形成する。なお、膜厚はシャッター２１の開閉によって所定の膜厚に制御される。以上の工程を所定の積層数くり返して素子部を完成する。

【０００７】

【発明が解決しようとする課題】しかしながら上記構成の積層薄膜コンデンサを上記の工程で製造する際に、特性と生産性の両面で大きな問題が生じていた。

【０００８】まず、特性面については、板状固定マスク１９の間隙からの有機材料の漏れによって、コンデンサ素子のパターン外の不必要な場所にモノマー成分や不完全重合成分や誘電体成分そのものが付着し、保護膜の付着力を低下させ封止性が劣化するという問題があった。

【０００９】必要パターン以外の場所へのモノマー成分や不完全重合物や誘電体成分そのものの付着は、特に熱分解重合または蒸着重合を用いた場合に顕著にあらわれ、主に基板１１を形成室１６，１７へ搬送する時に発生する。これは連続成膜を行うため、蒸発源をシャッター２１で開閉する構造を取らざる得ないので、遊離した有機物が形成室１６，１７に存在し、基板１１に付着してしまうためである。またパターン形成は、より効率よく連続成膜するためには、板状固定マスク１９を用いることがもっとも有効であるが、板状固定マスク１９では、基板１１との微小な間隙から上記成分が漏れるため、どの成膜方式を用いてもパターン以外の場所に上記成分が付着してしまう。

【００１０】このような特性上の問題については特願平２－３０７４５３号に示すように有機誘電体薄膜をパターン成膜したあとに基板全面にプラズマ照射を行うことによって特性劣化を防ぐことができるようになった。

【００１１】一方、生産性の問題については、上述したようにプラズマ照射という新たな工程が付加されたため、板状固定マスク１９を使って積層薄膜コンデンサ素子部を形成する場合、薄膜電極１２を形成する工程、有機誘電体薄膜１３を形成する工程、プラズマを照射する工程の三つの工程を一連の工程として必要な積層数までくり返さなければならず、積層数が多くなるにしたがって、生産性が低下してしまうという大きな問題が新たに生じていた。

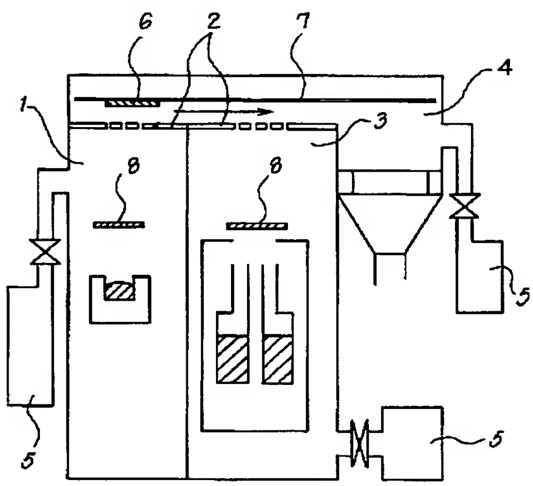
【００１２】フィルムの連続蒸着機などでは蒸着工程とグロー放電処理工程の二工程が同一真空槽内に組み込まれているものが従来から知られているが、上述の三つの工程を所定の回数までくり返して積層を行う方法については考えられていない。

【００１３】本発明は積層薄膜コンデンサ素子部を形成する一連の工程の処理能力を向上させる方法を提供することを目的とする。

【００１４】
【課題を解決するための手段】上記の目的を達成するために本発明の積層薄膜コンデンサの製造方法は、薄膜電極をパターン形成する工程と、有機誘電体薄膜をパターン形成する工程と、基板全面へプラズマを照射する工程とを同一圧力下でかつ同一真空槽内で行い、さらにこれらの工程をくり返す構成となっている。
【００１５】特にプラズマ照射法としてマイクロ波プラズマを利用している。
【００１６】
【作用】従来の課題を解決するために積層薄膜コンデンサの形成方法においては、薄膜電極の形成工程と誘電体薄膜の形成工程に加えてプラズマ処理工程の３つの工程それぞれに独立した真空槽を設けていた。よって各槽間で真空度が異なると真空度を保つための仕切り板が設けられ、素子の移動にはその仕切り板の開閉と圧力調整が必要となっていた。つまりこのような素子形成方法では例えば他の工程に比べて処理圧力の高い工程はいったん圧力を低くして素子を投入したのち圧力を高くして処理を行い、再び真空槽の圧力を低くして処理後の素子を取り出す必要がある。このような形成法を行うと１層当たりの所要時間が長く、多層化を行う場合、生産性を著しく低下させてしまう。ところが本発明では工程間の操作圧力が等しいため、素子の工程間の移動に際して、真空槽間の仕切り板の開閉やバルブなどによる圧力の調整が不必要となるばかりでなく、同一真空槽内での連続的な処理が可能となり生産性が大幅に向上する。さらに同軸管を使用したマイクロ波プラズマ照射は操作圧力が低く、電子ビーム法、蒸着重合法等の低圧力の工程との差圧が小さいためこれらの形成方法に対して有効である。
【００１７】
【実施例】
（実施例）以下、本発明の実施例について図１を参照しながら説明する。
【００１８】図１は、本発明の三工程を同一真空槽内に組み込んだ装置の概略断面図である。図１において、１は薄膜電極形成室であって、電子ビーム蒸着法を使用したＡｌの薄膜電極を板状固定マスク２でパターン形成する部屋である。３は誘電体薄膜形成室であって、蒸着重合法を使用した芳香族ポリユリア誘電体薄膜を板状固定マスク２でパターン形成する部屋である。４は同軸管方式のマイクロ波放電を使用したプラズマ処理室である。これらの部屋は３つの真空ポンプ５により圧力５×１０$^{-2}$ Ｐａまで排気される。
【００１９】上記、真空槽に導入された基板６は、基板搬送テーブル７に素子形成面を下向きにして取りつけられている。素子形成は、まず電子ビーム法によりアルミ蒸着膜を５００Å形成したのち、蒸着重合法により誘電体である芳香族ポリユリア薄膜を２０００Å形成する。なお、膜厚はシャッター８の開閉によって所定の膜厚に制御される。その後、引き続きプラズマ処理室４に搬入し、マイクロ波プラズマにより基板７全面にプラズマ照射を１分間行い余分な付着物を除去する。以上の工程をくり返して５０層（容量５ｎＦ）の素子を完成する。この方式によると１層当たりの処理時間は合計約４分程度であった。
【００２０】（比較例）以下、本発明の比較例について図２を参照しながら説明する。図２は、プラズマ処理法としてＲＦプラズマを使用したときの装置の概略断面図を示している。なお、上記実施例と同一部材については同一の図番を使用している。この比較例が図１の上記実施例の構成と異なるのは、プラズマ処理としてＲＦプラズマを使用した点と、各真空槽が独立し、仕切り板９で区切られている点である。
【００２１】ＲＦプラズマ処理を行う場合、処理圧力が１～１０Ｐａであり、他の工程と比較して圧力が高いので他の工程と分離するための仕切り板９が必要となる。よってＲＦプラズマ処理を行う場合、仕切り板９の開閉と素子移動時の圧力調整が必要となる。そこで実施例と同様の素子を形成すると１層当たりの処理時間は６分程度であった。
【００２２】この結果から明らかなように本実施例に示した素子形成法を行うと１層当たり約２分の時間短縮が可能となり処理能力が１．５倍となる。以上説明したように本実施例によれば、薄膜電極を形成する工程と有機誘電体薄膜を形成する工程と基板６全面へプラズマを照射する工程の三工程を同一圧力で行うことにより各工程毎の各部屋の差圧をなくすことが可能になり、同時に同一真空槽内に三工程を組み込むことにより、生産性の向上が可能となる。特に操作圧力が低いマイクロ波プラズマ処理方法を使用することは電子ビーム法、蒸着重合法等の高速成膜が可能な薄膜形成法との組合せにおいて非常に有効である。
【００２３】
【発明の効果】本発明は、上記実施例からも明らかなように薄膜電極形成と誘電体薄膜の形成と基板上へのプラズマ処理とを同一の圧力かつ同一の真空槽で行い、さらにこれらをくり返して積層することにより生産性のよい積層薄膜コンデンサの製造方法を実現できるものである。
【図面の簡単な説明】
【図１】本発明の実施例における積層薄膜コンデンサを形成する装置の概略断面図である。
【図２】本発明の比較例における積層薄膜コンデンサを形成する装置の概略断面図である。
【図３】積層薄膜コンデンサの概略断面図である。
【図４】従来の積層薄膜コンデンサを形成する装置の概略断面図である。
【符号の説明】
１　薄膜電極形成室（電子ビーム法）

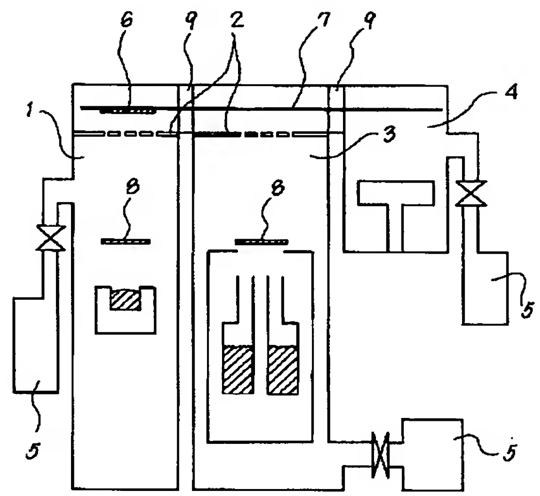
２　板状固定マスク
３　誘電体薄膜形成室（蒸着重合法）
４　プラズマ処理槽（マイクロ波ｏｒＲＦ）
５　真空ポンプ
６　基板
７　基板搬送テーブル
８　シャッター

【図１】

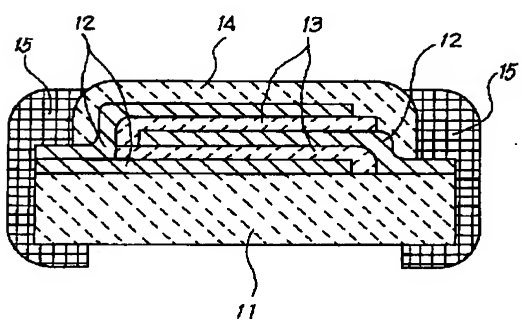


1 — 薄膜電極形成室
3 — 誘電体薄膜形成室
4 — プラズマ処理室
6 — 基板

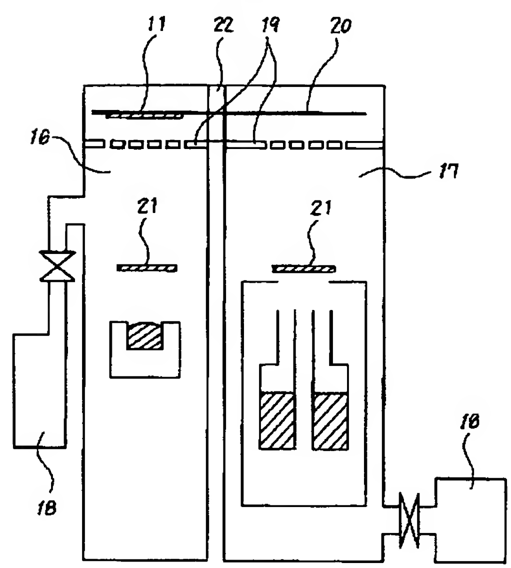
【図２】



【図３】



【図４】



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